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10/594,444	09/26/2006	Kenichi Maruhashi	Q97384	6862

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,444	MARUHASHI ET AL.	
	Examiner	Art Unit	
	KATHY WANG-HURST	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 21 October 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 22-48 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 22-48 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on 10/2/2008 has been entered. Claims 1-21 were cancelled. Claims 45-48 have been added. Claims 22-48 are still pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claims 22-48 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 22-26, 28, 30-33, 37-39, 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waxman (US 2006/0146705) in view of Bender (US 6920504).

Regarding claim 22, Waxman discloses a radio communications device ([0019]) comprising: a transmitter ([0020]) comprising: a plurality of transmission antennas for radiating radio waves based on transmission RF signals ([0020] [0022] and Fig. 2 item 260, antenna array); a plurality of transmitting circuit means for supplying the transmission RF signals to said plurality of the transmission antennas, respectively,

based on a plurality of transmission signals ([0020]-[0023]); and transmission signal processing means comprising modulating means, for modulating input transmission data to generate said plurality of the transmission signals by using said modulating means([0021]), and for outputting the modulated plurality of the transmission signals to said plurality of the transmitting circuit means([0021]); a receiver ([0020]) comprising:
a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio waves ([0020] [0022] and Fig. 2 item 260, antenna array);
a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively from by said plurality of the reception antennas([0020]-[0023]); and reception signal processing means comprising demodulating means([0021] [0047]), for demodulating the reception signals output respectively from said plurality of the receiving circuit means by using said demodulating means to generate reception data([0021] [0047] two-way radio transmitter and receivers therefore received modulated signals will be demodulated at receiver end); propagation detecting means for detecting a propagating state of said radio waves received by said plurality of the reception antennas ([0036]-[0038] detecting if signals are received and requesting retransmission if signal are not received); and
symbol rate setting means for selecting a symbol rate ([0038] transmit at lower data rate [0035] data represented using OFDM symbols, therefore setting to select a symbol rate), to be used during modulation and demodulation ([0021]), from a plurality of symbol rates based on the detected propagating state ([0037][0038]).

Waxman discloses symbol rate setting means for selecting a symbol rate but fails to disclose symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator. Bender teaches symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator (col. 4 lines 55-col. 5 line12).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

Regarding claim 23, Waxman discloses a radio communications device comprising: a transmitter ([0020]) comprising: a plurality of transmission antennas for radiating radio waves based on transmission RF signals ([0020] [0022] and Fig. 2 item 260, antenna array); a plurality of transmitting circuit means for supplying the transmission RF signals to said plurality of the transmission antennas, respectively, based on a plurality of transmission signals ([0021]); and transmission signal processing means comprising a plurality of modulating means having respective different modulating schemes ([0021]), for modulating input transmission data to generate said plurality of the transmission signals by using a selected one of said plurality of the modulating means ([0021]), and for outputting the transmission signals to said transmitting circuit means ([0021]); a receiver ([0020]) comprising: a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio

waves ([0022]); a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas ([0020]-[0023]); and reception signal processing means having a plurality of demodulating means comprising respective different demodulation schemes ([0021]), for demodulating the reception signals output respectively by said plurality of the receiving circuit means by using a selected one of said plurality of the demodulating means to generate reception data ([0020]-[0023]); propagation detecting means for detecting a propagating state of said received radio waves ([0037]-[0038]); and modulating means/demodulating means selecting means for selecting one of said modulating means and one of said demodulating means for modulating the input transmission data and for demodulating the reception signals, respectively ([0021] [0047] two-way radio transmitter and receivers therefore received modulated signals will be demodulated at receiver end).

Waxman discloses modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals, but fails to disclose modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals based on the detected propagating state. Bender teaches data rate is set according to the propagating state and data rate is selected in the modulator/ demodulator (col. 4 lines 55-col. 5 line12) and therefore the modulation scheme is set based on propagating state.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the

data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

Regarding claims 24 and 25, combination of Waxman and Bender discloses the radio communications device according to claim 22 and 23 respectively, wherein said received propagation detecting means detects the propagating state of said radio waves according to at least one of the following: the level of a reception electric power level of said received radio waves, a transmission error rate, a retransmission rate, or a channel matrix estimated in a spatial multiplexing process.

Regarding claim 26, Waxman discloses the radio communications device according to claim 22, further comprising control means for instructing said symbol rate setting means to set a high symbol rate or a low symbol rate in said modulating means and said demodulating means based on the propagating state detected by said propagation detecting means ([0037]-[0038]).

Regarding claim 28, combination of Waxman and Bender discloses the radio communications device according to claim 23, further comprising control means for instructing said modulating means/demodulating means selecting means to select modulating means and demodulating means which have a high symbol rate or to select modulating means and demodulating means which have a low symbol rate based on the propagating state of said radio waves as detected by said propagation detecting means.

Regarding claim 30, combination of Waxman and Bender discloses the radio communications device according to claim 26 or 27, further comprising:
means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said modulating means and said demodulating means, respectively, when said high symbol rate is set, and increasing the multilevel modulation index in said modulating means and said demodulating means, respectively, when said low symbol rate is set.

Regarding claim 31, combination of Waxman and Bender discloses the radio communications device according to claim 28 or 29, further comprising:
means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said selected modulating means and said selected demodulating means: respectively, when said high symbol rate is selected, and increasing the number multilevel modulation index in said selected modulating means and said selected demodulating means, respectively, when said low symbol rate is selected.

Regarding claim 32, Waxman discloses the radio communications device according to claim 26 or 27, wherein said transmission signal processing means and said reception signal processing means reduce the number of said transmitting circuit means to be used and the number of said receiving circuit means to be used when said high symbol rate is set, and increase the number of said transmitting circuit means to be used and the number of said receiving circuit means to be used when said low symbol rate is set ([0038]).

Regarding claim 33, Waxman discloses the radio communications device according to claim 28 or 29, wherein said transmission signal processing means and said reception signal processing means reduce the number of said transmitting circuit means to be used and the number of said receiving circuit means to be used when said high symbol rate is selected, and increase the number of said transmitting circuit means to be used and the number of said receiving circuit means to be used when said low symbol rate is selected ([0038]).

Regarding claim 37, combination of Waxman and Bender discloses the radio communications device according to claim 34, wherein said control means instructs said modulating means and said demodulating means to select any one of modulating and demodulating processes including ASK, BPSK, FSK, QPSK, and DQPSK and to use one of said plurality of transmitting circuit means and one of said plurality of receiving circuit means, respectively, when it is determined that the interference is weak (noise is low from SNR), and instructs said modulating means and said demodulating means to select either of modulating and demodulating processes including multivalued PSK and multivalued QAM and to use said plurality of transmitting circuit means and said plurality of receiving circuit means, respectively, when it is determined that the interference is strong (noise is high from SNR).

But combination of Waxman and Bender fails to explicitly disclose the multipath interference level is used as a benchmark to adjust modulation schemes. It is common knowledge that multipath interference is one of the major signal degradation sources in wireless communication.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use multipath interference level as a benchmark to adjust modulation schemes in order to more effectively address the biggest signal degradation problem.

Regarding claim 38, Waxman discloses the radio communications device according to claim 32, further comprising power supply control means for controlling power supplies of said plurality of transmitting circuit means and said plurality of receiving circuit means, respectively, to stop supplying electric power to the transmitting circuit means and the receiving circuit means which are not in use ([0014]).

Regarding claim 39, Waxman discloses the radio communications device according to claim 22, wherein said transmission antennas and said reception antennas are shared ([0047]).

Regarding claim 41, Waxman discloses a radio transmitter comprising:
a plurality of transmission antennas for radiating radio waves based on transmission RF signals ([0020]); a plurality of transmitting circuit means for supplying the transmission RF signals to said transmission antennas, respectively, based on a plurality of transmission signals ([0022]); transmission signal processing means having modulating means ([0021]), for modulating input transmission data to generate said transmission signals by using said modulating means ([0021]), and for outputting the transmission signals to said transmitting circuit means ([0021]); and symbol rate setting means for selecting a symbol rate to be used from a plurality of symbol rates based on a detected

propagating state of said radio waves, and for setting the selected symbol rate in said modulating means([0037][0038]).

Waxman discloses symbol rate setting means for selecting a symbol rate but fails to disclose symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator. Bender teaches symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator (col. 4 lines 55-col. 5 line12).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

Regarding claim 42, Waxman discloses a radio receiver comprising:
a plurality of reception antennas for receiving radio waves from a transmitter and outputting reception RF signals ([0020]); a plurality of receiving circuit means for outputting reception signals based on said reception RF signals input respectively from said reception antennas([0020]); reception signal processing means having demodulating means([0021]), for demodulating the reception signals output respectively from said receiving circuit means by using said demodulating means, and for generating reception data([0021]); and symbol rate setting means for selecting a symbol rate to be used from a plurality of symbol rates based on a detected propagating state of said radio waves([0037][0038]).

Waxman discloses symbol rate setting means for selecting a symbol rate but fails to disclose symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator. Bender teaches symbol rate setting means for setting the selected symbol rate in the modulator/ demodulator (col. 4 lines 55-col. 5 line12).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

Regarding claim 43, Waxman discloses a radio transmitter comprising:
a plurality of transmission antennas for radiating radio waves based on transmission RF signals([0020]); a plurality of transmitting circuit means for supplying the transmission RF signals to said transmission antennas, respectively, based on a plurality of transmission signals([0020]); transmission signal processing means having a plurality of modulating means having respective different symbol rates([0021] [0047]), for modulating input transmission data to generate said transmission signals by using a selected one of said modulating means([0021]), and for outputting the transmission signals to said transmitting circuit means ([0020]).

Waxman discloses modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals, but fails to disclose modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals based on the detected propagating

state. Bender teaches data rate is set according to the propagating state and data rate is selected in the modulator/ demodulator (col. 4 lines 55-col. 5 line12) and therefore the modulation scheme is set based on propagating state.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

Regarding claim 44, Waxman discloses a radio receiver comprising:
a plurality of reception antennas for receiving radio waves and outputting reception RF signals ([0020] [0022] and Fig. 2 item 260, antenna array); a plurality of receiving circuit means for outputting reception signals based on said reception RF signals input respectively from said reception antennas ([0020]); and reception signal processing means having a plurality of demodulating means having respective different symbol rates([0021]), for demodulating the reception signals input respectively from said receiving circuit means by using a selected one of said demodulating means, and for generating reception data ([0021] [0047] two-way radio transmitter and receivers therefore received modulated signals will be demodulated at receiver end).

Waxman discloses modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals, but fails to disclose modulator/demodulator selecting different modulating/demodulating schemes to modulate/demodulate reception signals based on the detected propagating

state. Bender teaches data rate is set according to the propagating state and data rate is selected in the modulator/ demodulator (col. 4 lines 55-col. 5 line12) and therefore the modulation scheme is set based on propagating state.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of Waxman, to select the data rate in modulator so that different data rates are generated according to different modulation schemes, as taught by Bender, thus allowing proper decoding of the transmitted data at the receiving destination (col. 5 lines 13-30).

5. Claims 27, 29 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waxman in view of Bender, further in view of Smith et al. (US 7315563), herein referred as Smith.

Regarding claim 27, combination of Waxman and Bender discloses the radio communications device according to claim 26, wherein said control means to change transmission rate based on propagating state of said radio weaves detected by said propagation detecting means. However, combination of Waxman and Bender fails to disclose the radio communications device wherein said control means to determines the intensity of multipath interference from the propagating state of said radio waves as detected by said propagation detecting means, instructs said symbol rate setting means to set a high symbol rate in said modulating means and said demodulating means when it is determined that multipath interference is weak, and instructs said symbol rate setting means to set a low symbol rate in said modulating means and said demodulating means when it is determined that multipath interference is strong.

Smith teaches a communication system in which the modulating means employ higher symbol rates when the mobile link is an isolated clear point-to-point path which is subject to low multipath, and opt for lower symbol rates (longer symbol periods) when the mobile link is subject to high multipath interference to combat the higher delay spread encountered in the mobile environment (col. 8 lines 18-40).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the communication system taught by Smith into the communication device disclosed by Waxman in order to enhance the communication device in a controlled manner to render the signal very difficult to intercept or interfere (col. 8 lines 18-40).

Regarding claim 29, combination of Waxman and Bender discloses the radio communications device according to claim 28, wherein said control means to change transmission rate based on propagating state of said radio weaves detected by said propagation detecting means. However, combination of Waxman and Bender fails to disclose the radio communications device wherein said control means to determines the intensity of multipath interference from the propagating state of said radio waves as detected by said propagation detecting means, instructs said symbol rate setting means to set a high symbol rate in said modulating means and said demodulating means when it is determined that multipath interference is weak, and instructs said symbol rate setting means to set a low symbol rate in said modulating means and said demodulating means when it is determined that multipath interference is strong.

Smith teaches a communication system in which the modulating means employ higher symbol rates when the mobile link is an isolated clear point-to-point path which is subject to low multipath, and opt for lower symbol rates (longer symbol periods) when the mobile link is subject to high multipath interference to combat the higher delay spread encountered in the mobile environment (col. 8 lines 18-40).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the communication system taught by Smith into the communication device disclosed by Waxman in order to enhance the communication device in a controlled manner to render the signal very difficult to intercept or interfere (col. 8 lines 18-40).

Regarding claim 34, combination of Waxman and Bender discloses the radio communications device according to claim 27 or 29, wherein said control means instructs said transmission signal processing means and said reception signal processing means to use one of said plurality of transmitting circuit means and one of said plurality of receiving circuit means, respectively based on detected conditions in order to achieve certain desired performance. However, combination of Waxman and Bender fails to disclose the radio communications device wherein said control means instructs said transmission signal processing means and said reception signal processing means to use one of said plurality of transmitting circuit means and one of said plurality of receiving circuit means, respectively, when it is determined that multipath interference is weak, and instructs said transmission signal processing means and said reception signal processing means to use said plurality of transmitting circuit

means and said plurality of receiving circuit means, respectively, when it is determined that multipath interference is strong.

Smith teaches a communication system in which the control means instruct signal processing means employ higher symbol rates when the mobile link is an isolated clear point-to-point path which is subject to low multipath, and opt for lower symbol rates (longer symbol periods) when the mobile link is subject to high multipath interference to combat the higher delay spread encountered in the mobile environment (col. 8 lines 18-40).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the communication system taught by Smith into the communication device disclosed by Waxman in order to enhance the communication device in a controlled manner to render the signal very difficult to intercept or interfere (col. 8 lines 18-40).

6. Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waxman in view of Bender, further in view of Kung et al. (US 2006/0141952), herein referred as Kung.

Regarding claim 35, combination of Waxman and Bender discloses the radio communications device according to claim 22 or 23, wherein said demodulating means has demodulation modes processing the demodulated reception signals to generate said reception data, said radio communications device further comprising modulation/demodulation mode selecting means for selecting and setting said modulation modes and said demodulation modes. Combination of Waxman and Bender

fails to disclose said modulating means has modulation modes including a direct modulation mode for directly modulating said transmission data into a transmission carrier and a indirect modulation mode for modulating said transmission data into a transmission carrier after the transmission data are processed.

Kung teaches a muti-mode modulator/demodulator which has direct modulation and indirect modulation in a communication transmitter ([0027]). Indirect modulation/demodulation has the advantage of high overall performance in terms of noise, linearity and power/gain control ([0080]). Direct modulation/demodulation has the advantages of simplified frequency planning, low cost implementation and compatibility with multiple modulation formats ([0040]).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the modulation/demodulation techniques taught by Kung into the radio communication device disclosed by Waxman in order to take advantage of both direct modulation/demodulation and indirect modulation/demodulation.

Regarding claim 36, combination of Waxman and Bender discloses the radio communications device according to claim 35, wherein said control means instructs said modulating means and said demodulating means to change according to detected signal condition such as impairments due to multipath. However Waxman fails to disclose said control means instructs said modulating means and demodulating means to use said direct modulation mode and said direct demodulation mode, respectively, when it is determined that multipath interference is weak, and instructs said modulating

means and said demodulating means to use said indirect modulation mode and said indirect demodulation mode, respectively, when it is determined that multipath interference is strong.

Kung teaches a multi-mode modulator/demodulator which has direct modulation and indirect modulation in a communication transmitter ([0027]). Indirect modulation/demodulation has the advantage of high overall performance in terms of noise, linearity and power/gain control ([0080]). Direct modulation/demodulation has the advantages of simplified frequency planning, low cost implementation and compatibility with multiple modulation formats ([0040]).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the modulation/demodulation techniques taught by Kung into the radio communication device disclosed by Waxman in order to take advantage of using direct modulation/demodulation for its power efficiency ([0040]) when there is a weak interference and the power level is not required to be high; and using indirect modulation/demodulation for its better performance in terms of noise and better gain control capability ([0027]) to enhance the signal when there is a strong interference.

combination of Waxman and Bender and Kung disclose switching between direct modulation mode and indirect modulation based on interference levels. But they fail to explicitly disclose the interference is multipath interference. It is common knowledge that multipath itnerference is one of the major interference sources in wireless communication.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate multipath interference into generic signal degradation sources in order to more effectively address the biggest signal degradation problem.

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Waxman in view of Bender and further in view of Borean et al. (US 2006/0206552), herein referred as Borean.

Regarding claim 40, combination of Waxman and Bender discloses the radio communications device according to any of claims 22, 27 and 29 but fails to disclose said radio waves have a frequency of 10 GHz or higher.

Borean teaches an OFDM transmitter using millimeter-wave carriers with carrier frequencies ranging between 40-60 GHz ([0007]). The use of millimeter-wave carrriers makes it possible to allocate to the users a much larger frequency band in comparison with standard WLAN systems ([0007]).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to incorporate the high carrier frequency taught by Borean into the radio communication device disclosed by Waxman in order to take advantage of using millimeter-wave carriers to obtain larger frequency band to the users ([0007]).

8. Claim 45-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waxman in view of Bender and further in view of Sang et al. (US 7230991).

Regarding claims 45, 46, 47 and 48, combination of Waxman and Bender discloses the radio communications device of claim 22, 23, 41 and 42, respectively, wherein the propagation detecting means receives as input based on the reception signals, a reception level of the reception signals, and a bit error rate of the reception signals, and detects the propagating state of the received radio waves based on the received input. But they fail to disclose putting the received signals to a channel matrix.

Sang teaches a channel matrix which is used to calculate MIMO channel capacity (col. 5 lines 29-50).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the invention of combination of Waxman and Bender, to incorporate a channel matrix in order to gauge channel capacity, as taught by Sang, thus allowing an estimation of channel capacity at any instant in time for any channel conditions (col. 4 line 40-col. 5 line 50).

Conclusion

9. This Action is made non-final.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHY WANG-HURST whose telephone number is (571) 270-5371. The examiner can normally be reached on Monday-Thursday, 7:30am-5pm, alternate Fridays, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nick Corsaro can be reached on (571) 272-7876. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KATHY WANG-HURST/
Examiner, Art Unit 2617

/NICK CORSARO/

Supervisory Patent Examiner, Art Unit 2617